REMARKS

Favorable reconsideration is respectfully requested.

The claims are 1 to 5.

The above amendment is responsive to the rejection in Official Action paragraph 4. The Examiner's suggestion in this regard has been adopted by the above amendment.

Claims 1 to 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. 5,368,921) in view of Sakaguchi et al. (EP 768,814), Touzaki (JP 11-77892), and Kawkita et al. (U.S. 5,817,404).

This rejection is respectfully traversed.

A brief discussion of the present invention will be of assistance in appreciating Applicants' reasons for traversal.

The present invention provides a copper-clad laminate of a glass fabric/thermasetting resin base material with a small-diameter penetration hole formed by irradiation with a carbon dioxide gas laser.

Because of the nature of the laminate, holes of excellent form and quality are realized. See, for example, page 2, line 23 to page 3, line 8 of the present specification.

Turning to the rejection, as pointed out therein, Ishii et al. disclose a metal foil-clad laminate obtained by lamination molding a resin-impregnated substrate and a metal foil (column 2, lines 22 to 24), the substrate can be a woven glass fabric with a preferred thickness of from 0.05 to 0.2 mm (column 2, lines 61 to 66), and the resin is dissolved in a solvent (column 4, lines 50 and 51), but Ishii et al. do not teach the weight of the glass fabric.

Sakaguchi et al. disclose "a woven glass cloth having a mass of 15 to 30 g/m^2, for use as a base material for printed wiring board material" (abstract) and that prepeg has a thickness of 0.040 to 0.080 mm (page 2, line 34). Sakaguchi et al. also disclose Figs. 3A and 3B depicting the woven glass cloth.

The rejection states "It would have been obvious to a person having ordinary skill in the art at the time of the invention to use a glass fabric weighing between 15 and 30 grams per square meter

in the circuit board of Ishii et al. in order to provide a lightweight material, as taught by Sakaguchi et al." (page 3, line 3 from bottom to page 4, line 2). However, Ishii et al. and Sakaguchi et al. do not at all disclose or suggest any gas permeability, which is an important requirement of the present invention.

The weight disclosed by Sakaguchi et al. partially overlaps that of the present claims. However, the present claims have the requirements of a specified woven fabric weight, a specified gas permeability and a specified thickness and therefore can give holes excellent in form and excellent in the form of hole walls when the holes are made with a carbon dioxide gas laser. Ishii et al. and Sakaguchi et al. do not at all teach or suggest the above highly advantageous features.

Further, Figs. 3A and 3B disclosed by Sakaguchi et al. are similar to Photograph 1 attached to the Rule 132 Declaration filed on March 12, 2003.

Photograph 1 shows a conventional glass woven fabric and its gas permeability is completely outside the range of the present claims. Even when the glass fabric of Sakaguchi et al., who does not recognize the problem sought to be overcome by the present invention at all, is used in Ishii et al., it is unobvious to consider using the glass fabric base material of the present invention since Ishii et al. and Sakaguchi et al. have no recognition of the importance of gas permeability in the present invention.

Touzaki discloses a process for the production of copper-clad laminate comprising fluidizing a resin composition which is solid or semisolid at normal temperature and composed of an epoxy resin, etc., through heating, applying the fluidized resin composition to a copper foil, then, loading a fiber base material thereon, laminating another copper foil and then heating the resultant set to integrate and cure it (claim 1).

Touzaki further discloses the use of a glass fiber woven fabric having a gas permeability of 1-15 $cc/cm^2/sec$. Touzaki discloses that when the gas permeability is lower than the above lower limit, it is difficult to impregnate the resin, and that when the gas permeability is larger than the above upper limit, undesirably, air bubbles are left in the base material in some cases.

The rejection states "It would have been obvious to one having ordinary skill in the art to use a glass fabric with a permeability between 1-15 $cc/cm^2/sec$ in the laminate of Ishii et al. in order

to have the resin sufficiently sink into the prepreg without forming air bubbles, as taught by Touzaki." (page 4, lines 6 to 9). However, as discussed in the Rule 132 Declaration of March 12, 2003, Table 1, right column, gas permeability is 78-250 cc/cm^2/sec according to the kinds of glass woven fabrics defined in IPC4412 (The Institute for Interconnecting and Packaging Electronic Circuits).

In contrast, the present invention has been completed based on the finding that, when a glass woven fabric having a gas permeability, etc., in the specific ranges is used and holes are made with a carbon dioxide gas laser, properties such as the form of holes and the form of hole walls become excellent.

Even if Touzaki, which only describes whether air bubbles are formed or not, is combined with the laminate of Ishii et al., it is impossible for a person skilled in the art to consider that the hole-making processability with a carbon dioxide gas laser can be improved.

Kawakita et al. disclose an aramid-epoxy sheet having a thickness of 200 μm is used as a prepreg and through a hole having a diameter of 0.15 mm is formed therein by means of carbon dioxide last beams (column 10, lines 45 to 51).

With regard to the substance of the base material, Kawakita et al. disclose "the fabric sheet base material is a nonwoven fabric of a heat resistant synthetic fiber or a paper impregnated with the thermosetting resin so that the resin impregnated fabric sheet is obtained" and "the fabric sheet is formed of a heat resistant synthetic fiber that is at least one of an aromatic polyamide fiber and a polyimide fiber" (column 3, lines 11 to 19).

Thus, with regard to the glass woven fabric of the present claims, Kawakita teaches away from the use thereof.

Kawakita et al. also disclose "According to a conventional glass epoxy board on which through holes are formed, the coefficient of thermal expansion of the semiconductor is different from that of the board so that the resistance is increased at the junction of the semiconductor and the board. Consequently, a disconnection is caused by the tenth time" (column 11, lines 24 to 30). Thus, Kawakita et al. teaches away from or at least is completely unappreciative of the present invention.

The rejection states "It would have been obvious to a person having ordinary skill in the art at the time of the invention to make small diameter holes in the composite of Ishii et al. in order to improve the performance of the circuit board, as taught by Kawakita et al. (page 4, lines 15 to 18).

In reply, Kawakita et al. only disclose that through holes having a diameter of 0.15 mm are formed by means of carbon dioxide gas laser beams, and thus base material of Kawakita et al. is completely different from that of the present invention. Of course, Kawakita et al. do not at all disclose or suggest the thickness, weight and gas permeability of glass woven fabric, which are the important requirements of the present invention.

Naturally, Kawakita et al. have no recognition of problems caused when glass fabric base material is irradiated with a carbon dioxide gas laser. Nor do any of the cited references have a recognition of such problems.

Therefore, it is unobvious for a person having ordinary skill in the art to arrive at the present invention from the cited references, alone or combined.

No further issues remaining, allowance of this application is respectfully requested.

If the Examiner has any comments or proposals for expediting prosecution, please contact undersigned at the telephone number below.

Respectfully submitted,

Morio GAKU et al.

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